REMARKS / ARGUMENTS

I. General Remarks and Disposition of the Claims

Please consider the application in view of the following remarks. Applicants thank the Examiner for his careful consideration of this application.

At the time of the Office Action, claims 1-12 were pending in this application. Claims 1-12 were rejected in the Office Action. Claims 2 was objected to in the Office Action. By this paper, claims 2 and 6 have been amended and claims 13-20 have been added. These amendments are supported by the specification as filed. For example, the amendment to claim 6 finds support at least on page 11, lines 3-14, of the specification as originally filed. All the amendments are made in a good faith effort to advance the prosecution on the merits of this case. It should not be assumed that the amendments made herein were made for reasons related to patentability. Applicants respectfully request that the above amendments be entered and further request reconsideration in light of the amendments and remarks contained herein.

II. Remarks Regarding Objections to the Claims

Claim 2 stands objected to. With regards to this objection, the Office Action states:

> The claim limitation is to the percentage of solid material in the droplets, but it is not stated whether the percentage is by weight, volume, or mole. This renders the claim unclear. For purposes of examination on the merits, the percentage has been treated as a weight percent. Appropriate correction is required.

(Office Action at 2.) As requested by the Examiner, Applicants have amended claim 2 to specify that the percentage of solid material in the droplets is by weight. Accordingly, Applicants respectfully request withdrawal of this objection with respect to claim 2.

III. Remarks Regarding Rejection of Claims 1-8 and 11-12 Under 35 U.S.C. § 103(a)

Claims 1-8 and 11-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,529,718 ("*Dupin*") in view of U.S. Patent Application Publication No. 2002/0002112 ("*Muramatsu*"). With respect to independent claim 1, the Office Action states:

> Regarding **claim 1**, Dupin teaches a method of coating an alumina-based slurry onto a metallic substrate for use as a catalyst. The costing slurry comprises water, and alumina binder, and a mixture of dispersible particulate alumina and undispersed

particulate alumina filler. The alumina filler has an average particle size of 1-15 μm (see claim 1). The amount if dispersibe alumina is between 10 and 40% of the particulate alumina (see claim 2). Dupin teaches that alumina binders whose viscosity can be varied by adjusting pH are known in the art, and that such a binder should be used for the alumina coating slurry (see column 3, lines 4-4 and 10-15). Therefore it would be obvious to one of ordinary skill in the art that Dupin teaches adjusting the pH of the slurry so that is of high viscosity.

Claim 1 differs from Dupin because Dupin does not teach that the substrate is coated by spraying the slurry onto the substrate with the substrate being heated to a[] temperature of 500°C to 750°C. However, the method of preparing a catalyst by spraying an oxide slurry onto a heated substrate was known in the art at the time the invention was filed. Muramatsu teaches a method of preparing a photocatalyst by spraying a colloidal metallic oxide solution onto the support while the support is heated to a temperature of between 200°C and 800°C, and in particular, 500°C (see Abstract, paragraph 0064, paragraph 0072, and paragraph 007. *Per MPEP 2144.05, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists*). One of ordinary skill in the art would have been motivated to use the spraying technique taught by Muramatsu to apply the slurry taught by Dupin because Muramatsu teaches that spraying onto a heated substrate improves the adhesion of the coating slurry (see paragraph 0013). This is clearly an advantageous improvement for coated catalyst supports. One would have expected reasonable success in this modification because both Dupin and Muramatsu teach methods of coating substrates with oxides for use as catalyst supports, so no detrimental results would be expected from the modification. Therefore, claim 1 is obvious and not patentably distinct over the prior art of record.

(Office Action at 3-4.) Applicants respectfully disagree.

In order for a reference or combination of references to form the basis for a rejection under § 103(a), a *prima facie* case of obviousness must be established. Obviousness is determined by construing the scope of the prior art, identifying the differences between the claims and the prior art, determining the level of skill in the pertinent art at the time of the invention, and considering objective evidence present in the application indicating obviousness or nonobviousness. *Graham v. John Deere*, 383 U.S. 1, 17 (1966). Applicants respectfully submit that due to the differences between the claims as currently amended and the cited references the Examiner has not established a *prima facie* case of obviousness, in that the

combination of *Dupin* and *Muramatsu* does not teach each and every recitation of the present claims.

A. Independent claim 1 is not rendered obvious in view of *Dupin* and *Muramatsu*.

***1. Dupin* and *Muramatsu* do not disclose forming "a support for a Fischer-Tropsch catalyst."**

First, the combination of *Dupin* and *Muramatsu* does not disclose a "process for coating a metal substrate with a layer of ceramic suitable as a support for a Fischer-Tropsch catalyst," as recited by independent claim 1. *Dupin* merely discloses a production process for an alumina support on a metal substrate. *Dupin*, col. 2, ll. 3-28. Nothing in *Dupin* discloses or suggests that the alumina support would be suitable for use as a support for a Fischer-Tropsch catalyst. *Muramatsu* cannot be used to render obvious this deficiency of *Dupin* as *Muramatsu* is directed to a photocatalyst and its method of manufacture. *Muramatsu*, Abstract. Accordingly, the combination of *Dupin* and *Muramatsu* fails to disclose each and every limitation of independent claim 1.

2. *Dupin* and *Muramatsu* do not disclose "adjusting the pH of the slurry so the slurry is of high viscosity."

Second, the combination of *Dupin* and *Muramatsu* does not disclose a process for coating a metal substrate that includes "adjusting the pH of the slurry so that slurry is of high viscosity," as recited by independent claim 1. Regarding the first reference, while *Dupin* discloses a catalytic coating process that uses both dispersible and particulate alumina, the coating procedure is entirely different than the procedure of claim 1. Rather than the claimed procedure that includes spraying, *Dupin* discloses a dipping procedure that requires comparatively low viscosity, between 10 and 800 cp. *See Dupin*, col. 6, ll. 4-8. This low viscosity is achieved, in part, by ensuring that the pH is less than 4. *See id.* col. 5, ll. 59-62, col. 12, ll. 15-17. As *Dupin* states is well known, as the pH of an alumina suspension is increased, it undergoes gelatification or coagulation at a value above about a pH of 9. *See id.* col. 3, ll. 10-15. In other words, an increase of pH from 4 to 9 leads to a very large increase in viscosity. Consequently, this citation teaches that the pH must be kept below 4 and, in the examples, the pH never exceeds 110 cP:

Example	pH	Viscosity	Coating Technique
Example 1	not provided	70 cP (col. 7, l. 66)	Coating by Immersion and Draining (col. 8, ll. 10-14)
Example 2	3.5 (col. 8, l. 39)	55 cP (col. 8, l. 43)	Coating by Immersion and Draining (col. 8, ll. 52-55)
Example 3	2.5 (col. 9, ll. 20-21)	110 cp (col. 9, ll. 27)	Coating by Immersion and Draining (col. 9, ll. 38-40)
Example 4	3.7 (col. 10, l. 1)	40 cP (col. 10, l. 6)	Coating by Immersion and Draining (col. 10, ll. 16-19)
Example 5	not provided	95 cP (col. 10, l. 57)	Coating by Immersion and Draining (col. 11, 1-2)

Thus, the Examiner correctly notes *Dupin* discloses that the pH of the slurry may change its viscosity. But *Dupin* does not teach that the pH should be changed in order to obtain a high viscosity. *Dupin* actually teaches the opposite, emphasizing that the pH must be kept below 4 so that the viscosity remains low.

Thus, independent claim 1 is clearly distinguished from *Dupin,* in that *Dupin* does not disclose the step of "adjusting the pH of the slurry so that slurry is of high viscosity." Indeed, it will be appreciated that the preferred values of viscosity, as set forth in the specification at page 9, line 12, are 13,000 to 14,000 cP, which are over 100 times greater than the values disclosed by *Dupin*. *Muramatsu* cannot be used to render obvious this deficiency of *Dupin*. Rather, the Examiner merely relies on *Muramatsu* for its alleged disclosure of "preparing a photocatalyst by spraying a colloidal metallic oxide solution onto the support while the support is heated." (Office Action at 4.) *Muramatsu* specifically discloses a colloidal solution having a viscosity of 10 to 100 cp, preferably 20 to 50 cP. *Muramatsu*, ¶ [0045]. Accordingly, the combination of *Dupin* and *Muramatsu* fails to disclose each and every limitation of independent claim 1.

3. *Dupin* and *Muramatsu* do not disclose the step of "spraying droplets of the slurry onto a hot metal substrate, the substrate being at a temperature between 500° and 750° C."

Finally, *Dupin* and *Muramatsu* do not disclose the step of "spraying droplets of the slurry onto a hot metal substrate, the substrate being at a temperature between 500° and 750°

C," as recited by independent claim 1. In regard to the first reference, the coating process of *Dupin* does include spraying droplets of a high viscosity slurry onto a heated substrate, as required by claim 1. Rather, as noted above, *Dupin* discloses a dipping procedure that requires comparatively low viscosity. *See Dupin*, col. 6, ll. 33-50. Accordingly, *Dupin* does not disclose each and every recitation of the claimed coating process.

Muramatsu cannot be used to render obvious this deficiency of *Dupin*. Rather, *Muramatsu* relates to a very different type of coating, that for a photo-catalyst, intended to form part of a photo electrode. *See Muramatsu*, ¶ [0013]. An alumina slurry is not envisaged, but rather the specific suggested examples are titanium oxide, zinc oxide, vanadium oxide, or strontium titanate. *See id.* ¶ [0038]. The metal oxide particles are provided exclusively as very small (dispersible) particles of from 5 to 30 nm with the viscosity of the colloidal solution set at between 10 and 100 cP, preferably 20 to 50 cP. *See id.* ¶¶ [0043], [0045]. Where a porous coating is to be made, *Muramatsu* discloses the addition of an organic compound to the colloidal solution. *See id.* ¶ [0048]. The coating may be performed by spraying onto a hot substrate, but this may for example be at 200°C. *See id.* ¶ [0085]. High-temperature spraying (above 500°C) is carried out with the solution that contains the added organic compound, as this high temperature is required to eliminate (by thermal decomposition) organic material, polyethylene glycol. *See id.* ¶¶ [0087], [0088].

It should be noted that the spray application of the first colloidal solution of *Muramatsu* was repeated 100 times, while the spray application of the second colloidal solution was repeated 400 times. *See Muramatsu*, ¶¶ [0086], [0088]. In *Muramatsu*, spraying the solutions onto a heated substrate is primarily perceived as simplifying the coating process, reducing the time needed to deposit the coating. *See id.* ¶¶ [0077], [0095].

Thus, the spraying technique of *Muramatsu* can be clearly distinguished from the spraying step of independent claim 1, in that *Muramatsu* does not spray droplets of a slurry containing both dispersible alumina and particulate alumina (to obtain porosity). It is also clearly distinguished in that claim 1 requires the spraying of droplets of a high-viscosity slurry, while the colloidal solution of *Muramatsu* has a viscosity of below 100 cP. Furthermore, *Muramatsu* uses a high-temperature spraying process for the thermal decomposition of organic material, while claim 1 does not require the inclusion of organic material in the slurry.

The Examiner has suggested that it would be obvious to "use the spraying technique taught by Muramatsu to apply the slurry taught by Dupin because Muramatsu teaches that spraying onto a heated substrate improves the adhesion of the coating slurry." (Office Action at 4.) As noted above, however, neither *Dupin* nor *Muramatsu* disclose the spraying of a high-viscosity slurry, as required by claim 1. Furthermore, *Muramatsu* does not disclose that spraying onto a heated substrate improves the adhesion. To support this proposition, the Examiner cites paragraph [0013] of *Muramatsu*. However, the cited paragraph refers to the benefits of the *Muramatsu* manufacturing process in general. Paragraphs [0033], [0034], and [0093] of *Muramatsu* indicate that the improved adhesion is due to the provision of a first layer which is of high-density metal oxide, above which is a more porous oxide layer. *Muramatsu*, ¶¶ [0033], [0034], and [0093]. With respect to the heated substrate, *Muramatsu* actually teaches spraying onto a high-temperature surface (above 500°C) only in order to eliminate by thermal decomposition the organic material, such as polyethylene glycol, in the second colloidal solution. *See id.* ¶¶ [0069], [0072] - [0073], [0085], [0087], [0088]. Since *Muramatsu* teaches spraying onto a high temperature (above 500°C) only in order to bring about thermal decomposition of an organic material, there would be no reason to adopt this high-temperature spraying with *Dupin*'s slurry, as it does not contain organic material.

Accordingly, the combination of *Dupin* and *Muramatsu* fails to disclose each and every limitation of independent claim 1.

B. Dependent claims 2-8 and 11-12 are not rendered obvious in view of *Dupin* and *Muramatsu*.

Applicants believe that dependent claims 2-8 and 11-12 are patentable over *Dupin* and *Muramatsu* and in condition for allowance. First, Applicants assert, as discussed above, that the combination of *Dupin* and *Muramatsu* does not disclose all of the elements recited in independent claim 1. For this reason alone, dependent claims 2-8 and 11-12, which are dependent thereon, are also allowable. In addition, dependent claims 2-8 and 11-12 also recite features that are not disclosed by the proposed combination.

For example, claim 7 recites that "the layer increases in porosity towards its exposed surface." As this claim depends from claim 6 and claim 1, this claim is concerned with porous alumina supports as a catalyst support for a Fischer-Tropsch catalyst, in which the porosity increases towards the surface, made by spraying compositions that differ in the proportion of particulate to dispersible alumina. While *Dupin* discloses production of an alumina

coating, this reference does not disclose varying porosity. While *Muramatsu* discloses a photo catalytic structure in which two layers are of different porosity, the layers are not of alumina, are not for a Fischer-Tropsch catalyst support, and the porosity difference is not achieved in the manner of this claim. Accordingly, claim 7 is clearly not rendered obvious by the combination of *Dupin* and *Muramatsu*.

By way of further example, claim 12 is directed to a process that includes incorporating a catalytic metal into the ceramic layer. With respect to this claim, the Examiner has noted that *Muramatsu* suggests impregnating the oxide layer with a metallic compound such as titanium tetrachloride, and baking so as to form metallic oxide. (Office Action at 6-7.) It should be noted that the oxide layer itself is also titanium oxide, in this example (see paragraph [0059]), and this is treatment with titanium tetrachloride is aimed at forming additional titanium oxide and helping bond the particles together. This does not render obvious formation of a catalyst for Fischer-Tropsch synthesis in which a catalytic metal is required.

Claim 12 further requires repeated incorporation and calcining of the catalyst metal. It is submitted that this is certainly not an obvious procedure and is not disclosed or suggested by the cited references. The Examiner, however, asserts that "these steps would be known and obvious to one desiring to increase the metallic oxide load in the ceramic material." Essentially, the Examiner has taken Official Notice of facts outside of the record that the Examiner apparently believes are capable of demonstration as being "well-known" in the art. Therefore, in accordance with M.P.E.P. § 2144.03, the Applicants hereby seasonably traverse and challenge the Examiner's use of Official Notice. Furthermore, Applicants emphasize that the "well-known" facts asserted by the Examiner are not of a "notorious character" and are clearly not "capable of such instant and unquestionable demonstration as to defy dispute." *See* M.P.E.P § 2144.03. Specifically, the Applicants respectfully request that the Examiner produce evidence in support of the Examiner's position as soon as practicable during prosecution and that the Examiner add a reference to the rejection in the next Official Action. If the Examiner finds such a reference and applies it in combination with the presently cited references, the Applicants further request that the Examiner specifically identify the portion of the newly cited reference that discloses the allegedly "well known" elements of the instant claim, as discussed above, or withdraw the rejection. If the Examiner relies only on personal knowledge, then the Applicants

respectfully stress that the Examiner must provide an affidavit or declaration in support of such personal knowledge. *See id.*

C. Applicants request withdrawal of § 103(a) rejections of claims 1-8 and 11-12.

Therefore, Applicants respectfully assert that independent claim 1 and its dependent claims are not rendered obvious by the combination of *Dupin* and *Muramatsu*. Accordingly, Applicants request withdrawal of this rejection with respect to claims 1-8 and 11-12.

IV. Remarks Regarding Rejection of Claim 9 Under 35 U.S.C. § 103(a)

Claims 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dupin* in view of *Muramatsu* in further view of U.S. Patent No. 6,369,900 ("*Johnson*"). Applicants respectfully disagree. In order for a reference or combination of references to form the basis for a rejection under § 103(a), a *prima facie* case of obviousness must be established. Obviousness is determined by construing the scope of the prior art, identifying the differences between the claims and the prior art, determining the level of skill in the pertinent art at the time of the invention, and considering objective evidence present in the application indicating obviousness or nonobviousness. *Graham v. John Deere*, 383 U.S. 1, 17 (1966). Applicants respectfully submit that due to the differences between the claims as currently amended and the cited references the Examiner has not established a *prima facie* case of obviousness, in that the combination of *Dupin*, *Muramatsu*, and *Johnson* do not teach each and every recitation of the present claims.

Claim 9 is directed to a process that includes incorporating a catalytic metal into the ceramic layer. As required by claim 9, the metal is incorporated by a process that includes "contacting the ceramic layer with a solution of a salt of the metal in a solvent comprising an organic liquid whose surface tension and viscosity are lower than those of water."

First, *Dupin* and *Muramatsu* do not disclose each and every recitation of claim 9. As discussed above in Section III, *Dupin* and *Muramatsu* fail to teach each and every limitation of independent claim 1. Claim 9 depends from independent claim 1 and, thus, requires these same limitations that *Dupin* and *Muramatsu* fail to disclose. Furthermore, claim 9 also separately recites features that are not disclosed by *Dupin* and *Muramatsu*.

Furthermore, *Johnson* cannot be used to cure the deficiencies of *Dupin* and *Muramatsu*. For example, the Examiner has suggested that claim 9 would be obvious in light of

Johnson; however, the Examiner has misinterpreted this reference. *Johnson* is concerned with producing a metal aluminate, such as zinc aluminate, which may be used as a catalyst support. *See Johnson*, Abstract. This metal aluminate is produced by combining alumina with a salt (*e.g.*, zinc nitrate) preferably in molten form, and subsequently dried and calcined. *Johnson*, Example 1, Support C. In this case, the zinc combines with the alumina to form zinc aluminate, which may subsequently be used as a catalyst support. *See id.* Hence, *Johnson* does not disclose a process for introducing a catalytic metal into a ceramic layer, as required by claim 9.

Thus, claim 9 is patentable over the combination of *Dupin*, *Muramatsu*, and *Johnson*. Accordingly, Applicants respectfully request withdrawal of this rejection with respect to claim 9.

V. Remarks Regarding Rejection of Claim 10 Under 35 U.S.C. § 103(a)

Claims 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over *Dupin* in view of *Muramatsu* in further view of U.S. Patent No. 4,956,718 ("*Gouzard*"). Applicants respectfully disagree. In order for a reference or combination of references to form the basis for a rejection under § 103(a), the reference or combination of references must teach or suggest all of the elements of the claim. As discussed above in Section III, *Dupin* and *Muramatsu* fail to teach each and every limitation of independent claim 1. Moreover, *Gouzard* fails to render obvious the deficiencies of *Dupin* and *Muramatsu*. Rather, the Examiner merely relied on *Gouzard* for its alleged teaching of a protective coating step. (Office Action at 8.) Claim 10 depends from independent claim 1 and therefore includes all the limitations of that claim. Thus, claim 10 is patentable over the combination of *Dupin*, *Muramatsu*, and *Gouzard*. Accordingly, Applicants respectfully request withdrawal of this rejection with respect to claim 10.

VI. Remarks Regarding New Claims

As set forth above, Applicants have added new claims 13-20. For the reasons discussed above and other claim features, Applicants believe that these claims are patentable over the cited references and in condition for allowance. Therefore, the Applicants request that the Examiner allow the new claims 13-20.

VII. No Waiver

All of Applicants' arguments and amendments are without prejudice or disclaimer. Additionally, Applicants have merely discussed example distinctions from the cited

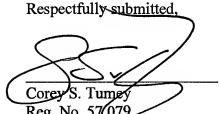
references. Other distinctions may exist, and Applicants reserve the right to discuss these additional distinctions in a later Response or on Appeal, if appropriate. By not responding to additional statements made by the Examiner, Applicants do not acquiesce to the Examiner's additional statements, such as, for example, any statements relating to what would be obvious to a person of ordinary skill in the art.

SUMMARY

In light of the above amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections. Applicants further submit that the application is now in condition for allowance, and earnestly solicit timely notice of the same. Should the Examiner have any questions, comments or suggestions in furtherance of the prosecution of this application, the Examiner is invited to contact the attorney of record by telephone, facsimile, or electronic mail.

Applicants believe that no fees are due in association with the filing of this response. Should the Commissioner deem that any fees are due, including any fees for extensions of time, Applicants respectfully request that the Commissioner accept this as a Petition Therefor, and direct that any additional fees be charged to Baker Botts, L.L.P.'s Deposit Account No. 02-0383, Order Number 079005.0117.

Respectfully submitted,



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